Safety of Foods Derived from Genetically Engineered Crops

Daniel Bush
Department of Biology
Colorado State University

Although there were, and continue to be, legitimate questions about the safety of GMO foods as this technology entered the market place, to date there are no credible studies demonstrating any changes in the nutritional content of these foods nor negative impacts on human health. The few studies reporting negative effects have generally not held up to scientific scrutiny. For example, a recent publication that received a lot of press about roundup ready maize and cancer was later roundly criticized for several fundamental problems with experimental design and bad statistics (Hyped GM maize study).

The U.S. Institute of Medicine and National Research Council 2004 report *Safety of Genetically Engineered Foods*, states "To date, no adverse health effects attributed to genetic engineering have been documented in the human population." More recently (10/11), the American Association for the Advancement of Science (the premier scientific society in America) published a statement by the board of directors supporting the safety of GMO foods and opposing labeling of GMO food products. They argue that efforts to impose labeling are "not driven by evidence that GM foods are actually dangerous." Indeed, they cited a recent study that showed a dozen long-term animal feeding studies comparing GM and non-GM potatoes, soy, rice, corn and triticale found that the GM and their non-GM foods are nutritionally equivalent (Food & Chemical Toxicology 2012).

Cited Literature:

Food and Chemical Toxicology 50 (2012) 1134–1148
American Association for the Advancement of Science statement by the AAAS Board of Directors on labeling GMO foods. 10/2012
Nature 490, 158 (10/11/2012) Hyped GM maize study. doi:10.1038/490158a

Statement by the AAAS Board of Directors On Labeling of Genetically Modified Foods

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

20 October 2012

There are several current efforts to require labeling of foods containing products derived from genetically modified crop plants, commonly known as GM crops or GMOs. These efforts are not driven by evidence that GM foods are actually dangerous. Indeed, the science is quite clear: crop improvement by the modern molecular techniques of biotechnology is safe. Rather, these initiatives are driven by a variety of factors, ranging from the persistent perception that such foods are somehow "unnatural" and potentially dangerous to the desire to gain competitive advantage by legislating attachment of a label meant to alarm. Another misconception used as a rationale for labeling is that GM crops are untested.

The EU, for example, has invested more than €300 million in research on the biosafety of GMOs. Its recent report[1] states: "The main conclusion to be drawn from the efforts of more than 130 research projects, covering a period of more than 25 years of research and involving more than 500 independent research groups, is that biotechnology, and in particular GMOs, are not per se more risky than e.g. conventional plant breeding technologies." The World Health Organization, the American Medical Association, the U.S. National Academy of Sciences, the British Royal Society, and every other respected organization that has examined the evidence has come to the same conclusion: consuming foods containing ingredients derived from GM crops is no riskier than consuming the same foods containing ingredients from crop plants modified by conventional plant improvement techniques.

Civilization rests on people's ability to modify plants to make them more suitable as food, feed and fiber plants and all of these modifications are genetic. Twentieth century advances in the science of genetics opened the way to using chemicals and radiation as means of accelerating genetic change to produce nutritionally enhanced foods like lycopene-rich Rio Star grapefruit and quite literally thousands of other improved fruit, vegetable and grain crop varieties. Modern molecular genetics and the invention of large-scale DNA sequencing methods have fueled rapid advances in our knowledge of how genes work and what they do, permitting the development of new methods that allow the very precise addition of useful traits to crops, such as the ability to resist an insect pest or a viral disease, much as immunizations protect people from disease.

In order to receive regulatory approval in the United States, each new GM crop must be subjected to rigorous analysis and testing. It must be shown to be the same as the parent crop from which it was derived and if a new protein trait has been added, the protein must be shown to be neither toxic nor allergenic. As a result and contrary to popular misconceptions, GM crops are the most extensively tested crops ever added to our food supply. There are occasional claims that feeding GM foods to animals causes aberrations ranging from digestive disorders, to sterility, tumors and premature death. Although such claims are often sensationalized and receive a great deal of media attention, none have stood up to rigorous scientific scrutiny. Indeed, a recent review of a dozen well-designed long-term animal feeding studies comparing GM and non-GM potatoes, soy, rice, corn and triticale found that the GM and their non-GM counterparts are nutritionally equivalent[2].

It is the long-standing policy of the Food and Drug Administration (FDA) that special labeling of a food is required if the absence of the information provided poses a special health or environmental risk. The FDA does not require labeling of a food based on the specific genetic modification procedure used in the development of its input crops. Legally mandating such a label can only serve to mislead and falsely alarm consumers.

Approved by the AAAS Board of Directors on 20 October 2012

AAAS
ADVANCING SCIENCE, SERVING SOCIETY

1 http://ec.europa.eu/research/biosociety/pdf/ a_decade_of_eu-funded_gmo_research.pdf
2 Snell C, Bernheim A, Berge J-B, Kuntz M, Pascal G, Paris A and Ricroch A E (2012). Assessment of the health impact of GM plant diets in long-term and multigenerational animal feeding trials: a literature review. Food and Chemical Toxicology, 50: 1134-48.